

Massachusetts Department of Environmental Protection
Source Water Assessment and Protection (SWAP) Report
for
Ware Water Department

What is SWAP?

The Source Water Assessment and Protection (SWAP) Program, established under the federal Safe Drinking Water Act, requires every state to:

- inventory land uses within the recharge areas of all public water supply sources;
- assess the susceptibility of drinking water sources to contamination from these land uses; and
- publicize the results to provide support for improved protection.

Susceptibility and Water Quality

Susceptibility is a measure of a water supply's potential to become contaminated due to land uses and activities within its recharge area.

A source's susceptibility to contamination does *not* imply poor water quality.

Water suppliers protect drinking water by monitoring for more than 100 chemicals, disinfecting, filtering, or treating water supplies, and using source protection measures to ensure that safe water is delivered to the tap.

Actual water quality is best reflected by the results of regular water tests. To learn more about your water quality, refer to your water supplier's annual Consumer Confidence Reports.

Table 1: Public Water System Information

<i>PWS Name</i>	Ware Water Department
<i>PWS Address</i>	Ware Department of Public Works 4 ½ Church Street
<i>City/Town</i>	Ware, Massachusetts
<i>PWS ID</i>	1309000
<i>Local Contact</i>	Mr. Gilbert St. George-Sorel
<i>Phone Number</i>	(413) 967-9620

Introduction

We are all concerned about the quality of the water we drink. Drinking water wells and reservoirs may be threatened by many potential contaminant sources, including stormwater runoff, road salting, and improper disposal of hazardous materials. Citizens and local officials can work together to better protect these drinking water sources.

Purpose of this report:

This report is a planning tool to support local and state efforts to improve water supply protection. By identifying land uses within water supply protection areas that may be potential sources of contamination, the assessment helps focus protection efforts on appropriate Best Management Practices (BMPs) and drinking water source protection measures.

Refer to Table 3 for recommendations to address potential sources of contamination. Department of Environmental Protection (DEP) staff are available to provide information about funding and other resources that may be available to your community.

This report includes the following sections:

1. Description of the Water System
2. Land Uses within Protection Areas
3. Source Water Protection
4. Appendices

Section 1: Description of the Water System

Glossary

Aquifer: An underground water-bearing layer of permeable material that will yield water in a usable quantity to a well.

Hydrogeologic Barrier: An underground layer of impermeable material (i.e. clay) that resists penetration by water.

Recharge Area: The surface area that contributes water to a well.

Zone I: The area closest to a well; a 100 to 400 foot radius proportional to the well's pumping rate. This area should be owned or controlled by the water supplier and limited to water supply activities.

Zone II: The primary recharge area for the aquifer. This area is defined by hydrogeologic studies that must be approved by DEP. Refer to the attached map to determine the land within your Zone II.

The attached map shows Zone I and II protection areas for your groundwater supplies.

System Susceptibility: High

Groundwater Sources

MA GIS Zone II ID #: 490

Susceptibility: High

<i>Well Name</i>	<i>Source ID#</i>
Wells 1/2/3	1309000-01G
Well #4 — Snow Pond	1309000-02G
Cistern	1309000-04G

MA GIS Zone II ID #: 193

Susceptibility: High

<i>Well Name</i>	<i>Source ID#</i>
Dismal Swamp Well	1309000-03G

Ware is a medium sized, west-central Massachusetts town located just south of the Quabbin Reservoir in the foothills of the central highlands. The town developed primarily as an industrial mill center in the mid-1800s utilizing waterpower from the Ware River. A few of the mills still exist, but Ware is now primarily a rural, residential community. The Ware Water Department maintains and operates four groundwater sources located within two distinct sand and gravel aquifers. Wells 1/2/3 (01G) is a set of three, 8 x 18-inch diameter, gravel packed wells installed in 1978 to replace a shallow tubular wellfield just north of Pines Pond. Well #4, Snow Pond Well (02G), is an 18 x 24-inch diameter, gravel packed well located just north of Pines Pond and just south of Snow Pond.

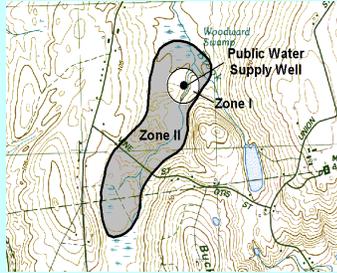
The Cistern (04G) is a 41-foot diameter, caisson (collection cistern) located adjacent to the Pines Pond that served as the original water source for the Town for a few years in the late-1800s. These three sources (01G, 02G and 04G) are located within the same relatively shallow, unconfined sand and gravel aquifer along the Muddy Brook valley. The Zone II (GIS ID # 470) for wells (01G, 02G and 04G) was delineated as part of the SWAP program utilizing empirical data, analytical modeling and geologic mapping. Part of the Zone II #470, in the Muddy Brook valley for sources 01G and 02G, is served by municipal sewer, however, there is no sewer in the northern part of the Zone II. The Zone II #470, (upgradient extent terminates at the positive recharge boundary, Hardwick Pond.)

The Dismal Swamp well (03G), is a 12 x 18-inch diameter gravel packed well located immediately adjacent to the Ware River. The Ware River valley is also a relatively shallow, unconfined sand and gravel aquifer. The Dismal Swamp Well (03G) was developed to supplement the existing wells during times of peak demand. The Zone II #193, in the Ware river valley for the Dismal Swamp well, was delineated as part of the New Source Approval Process utilizing empirical data from an extended pumping test, geologic mapping and a numerical model. The Zone II area includes a small private airstrip, the river, a few residences, a propane distributor and a small office. There are no municipal sewers in this area.

Data from well development and geologic mapping indicate both aquifers are glacially deepened bedrock valleys that were filled with sand and gravel during the glacial recession (melting) some 12,000 years ago. The sand and gravel deposits in the narrow bedrock valley aquifers utilized by these wells are mapped as glacial outwash deposits of kames, kame terraces and recent stream outwash deposits. Boring logs indicate some local, isolated fine sand, silt or clay deposits overlying the coarse aquifer sand and gravel, however, there is no indication of a continuous confining unit.

What is a Protection Area?

A well's water supply protection area is the land around the well where protection activities should be focused. Each well has a Zone I protective radius and a Zone II protection area.



The bedrock underlying the area is primarily mapped as schist of the Littleton Formation, the Monson Gneiss and the Hardwick Quartz Diorite.

Wells located in unconfined aquifers are considered to be highly vulnerable to contamination because the hydrogeologic barrier (i.e. clay) is not continuous throughout the developed recharge area. Please refer to the attached map to view the boundaries of the Zone II for each well.

Water from the wells is not treated. A chlorinator is available for disinfected prior to distribution if it is required.

For current information on monitoring results and treatment and for a copy of the most recent Consumer Confidence Report, please contact the Public Water System contact person listed above in Table 1. Drinking water monitoring reporting data is also available on the web at <http://www.epa.gov/safewater/ccr1.html>.

Section 2: Land Uses in the Protection Areas

The Zone II area (# 490) for the wells located in Muddy Brook valley is 55%

forest, water or wetland, with the remaining area a mix of low to high density residential land use (22%), a few commercial activities and agricultural activities. The most densely developed southern portion of the Zone II near the wells in the Muddy Brook valley is served by municipal sewer. However, the area immediately upgradient of the Snow Pond Well (04G) is not served by municipal sewer. The Zone II (# 193) for the Dismal Swamp well is primarily wetland, forest and open land (57%). The proximity of recreational, residential and commercial activities that utilize

on-site septic disposal pose the greatest threat to the water sources. Land uses and activities that are potential sources of contamination are listed in Table 2, with further detail provided in the Table of Regulated Facilities and Table of Underground Storage Tanks in Appendix B.

Key Land Uses and Protection Issues include:

1. Non-conforming Zone I
2. Residential Land Uses
3. Transportation Corridors/Utility Right-of-way
4. Hazardous Materials Storage and Use
5. Comprehensive Wellhead Protection Planning

The overall ranking of susceptibility to contamination for the entire system is high, based on the presence of at least one high threat land use within the water supply protection areas, as seen in Table 2.

1. Non-conforming Zone I – The Zone I for the wells is a 400-foot radial area around each of the wellheads. Massachusetts drinking water regulation (310 CMR 22.00 Drinking Water) requires public water suppliers to own the Zone I, or control the Zone I through a conservation restriction. Activities other than those directly related to the public water supply are prohibited within the Zone I. However, many public water supply sources were developed prior to promulgation of the Department's regulation and contain non-water supply activities such as homes and public roads. The Town owns the entire Zone I for the recently developed Dismal Swamp well (03G). The wells in the Muddy Brook valley are non-conforming, with residential and recreational land uses in the Zone I. The Zone I of the Cistern source has a baseball field with vehicle parking, residential homes that are connected to the sewer system and the Water Department's maintenance garage.

What is a Zone III?

A Zone III (the secondary recharge area) is the land beyond the Zone II from which surface and ground water drain to the Zone II and is often coincident with the watershed boundary.

The Zone III is defined as a secondary recharge area for one or both of the following reasons:

1. The low permeability of underground water bearing materials in this area significantly reduces the rate of groundwater and potential contaminant flow to the Zone II.
2. The groundwater in this area probably discharges to surface water feature such as a river rather than discharging directly into the aquifer.

The land uses within the Zone III are assessed only for sources that are shown to be groundwater under the direct influence of surface water.

The following non-conforming activities are located within the Zone I of the wells:

Wells #1, 2 and 3 (01G) - Wells #1, 2 and 3 (source 01G) are located within a residential area of town. A portion of Pleasant Street, two homes and portions of two other lots are located within the Zone I of source 01G; the three lots with homes are served by Town sewer and water. There is also a town baseball field within the Zone I; parking occurs within the Zone I during events at the field.

Well #4 (02G) - Well #4 is located north of the source 01G (Wells 1, 2 and 3). A portion of Pleasant Street, two homes (one served by a private septic system and one served by the Town sewer system) are located within the Zone I.

Cistern (04G) - The Cistern (04G) is located south of source 01G. The baseball field and parking area, the Water Department's motor control building (old pumping station), the storage (maintenance) garage and residential backyards are within the Zone I of the Cistern. The motor control building has secondary containment for the petroleum products stored on site.

What are "BMPs?"

Best Management Practices (BMPs) are measures that are used to protect and improve surface water and groundwater quality. BMPs can be structural, such as oil & grease trap catch basins, nonstructural, such as hazardous waste collection days or managerial, such as employee training on proper disposal procedures.

Zone I Recommendations:

- ✓ To the extent feasible, remove all non-water supply activities from the Zone I to comply with DEP's Zone I requirements. Prohibit new non-water supply activities in the Zone I.
- ✓ Ensure that residents are aware of best management practices (BMPs) with respect to household hazardous materials and lawn chemicals.
- ✓ Where it is feasible, remove all hazardous materials from the Zone I of the cistern. Use BMPs for the storage, use, and disposal of hazardous materials such as water supply chemicals and maintenance chemicals, specifically at the maintenance garage.
- ✓ Do not use or store pesticides, fertilizers or road salt within the Zone I. Ensure that the Town does not use pesticides or fertilizers on the baseball field.
- ✓ Periodically inspect the stormwater runoff in the vicinity of the sources to ensure the runoff is directed away from the sources.
- ✓ Agreement Options - Until land is available for acquisition or preservation, attempt to obtain a Memorandum of Understanding and Right of First Refusal. A Memorandum of Understanding (MOU) is an agreement between the landowner and public water supplier in which the landowner agrees not to engage in specific threatening activities. The MOU should be specific to the land use or activity. For instance, if the land is residential with a septic system,

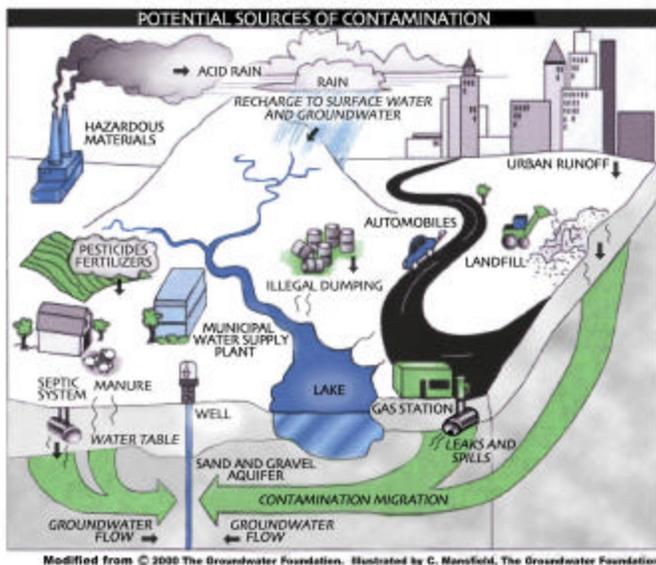


Figure 1: Sample watershed with examples of potential sources of contamination

the owner could agree not to place chemicals, petroleum products, or other hazardous or toxic substances, including septic system cleaners, into the septic system, and agree that the system will be pumped at a specific frequency. Understanding how an activity threatens drinking water quality is an important component of developing an effective MOU.

A Right of First Refusal is a legal document that gives the water supplier the first chance to purchase land when it becomes available. See Right of First Refusal in the Appendices.

3. Residential Land Uses – The Muddy Brook Zone II (#470) area has 20% residential land use; the Ware River Zone II (#193) has 6% residential land use. If managed improperly, activities associated with residential areas can contribute to drinking water contamination. Common potential sources of contamination include:

Potential Source of Contamination vs. Actual Contamination

The activities listed in Table 2 are those that typically use, produce, or store contaminants of concern, which, if managed improperly, are potential sources of contamination (PSC).

It is important to understand that a release may never occur from the potential source of contamination provided facilities are using best management practices (BMPs). If BMPs are in place, the actual risk may be lower than the threat ranking identified in Table 2. Many potential sources of contamination are regulated at the federal, state and/or local levels, to further reduce the risk.

Table 2: Land Use in the Water Supply Protection Areas

For more information, refer to Appendix B: Regulated Facilities within the Water Supply Protection Area

Land Uses	Quantity	Threat	Zone II	Potential Contaminant Sources*
Agriculture				
Dairy Farm	1	H	470	Improper handling of manure (microbial contaminants); pesticides, petroleum products (handling, storage)
Crop land	Few	H	470	Pesticides, petroleum products from farm equipment
Livestock Operations (Non-commercial)	1	M	470	Improper handling of manure (microbial contaminants) pesticides, petroleum products (handling, storage)
Miscellaneous				
21E Release sites	2	-	470	Refer questions to the Bureau of Waste Site Cleanup for current status of sites
Aquatic Wildlife	Occasional	M/H	470	Microbial contaminants
Transportation Corridors/Utility Right-of-way	Numerous	M/H	Both	Accidental leaks or spills of fuels and other hazardous materials, over-application or improper handling of pesticides
Sand & Gravel operations	2	M	470	Accidental leaks or spills of fuels and other hazardous materials; clandestine dumping
Cemeteries	2	M	470	Leaks and spills of petroleum products (lawn care), historic and recent embalming fluids
Auto Repair Shops/ Construction	1	H	470	Leaks and spills of petroleum products and other hazardous materials
Airport (private small grass strip)	1	L/M	193	Leaks and spills of petroleum products and other hazardous materials
Railroad Tracks	1	H	193	Accidental leaks or spills of fuels and other hazardous materials, over-application or improper handling of pesticides
Propane distributor	1	M	193	Delivery vehicles
Auto Sales	1	H	470	Accidental leaks or spills of fuels and other hazardous materials
Residential				
Fuel Oil Storage (at residences)	Numerous Few	M/H	470 193	Fuel oil: spills, leaks, or improper handling
Lawn Care / Gardening/ Hay	Numerous Few	M	470 193	Pesticides: over-application or improper storage and disposal
Septic Systems / Cesspools	Few	M	Both	Hazardous chemicals: microbial contaminants, and improper disposal

Notes:

1. When specific potential contaminants are not known, typical potential contaminants or activities for that type of land use are listed. Facilities within the watershed may not contain all of these potential contaminant sources, may contain other potential contaminant sources, or may use Best Management Practices to prevent contaminants from reaching drinking water supplies.
2. For more information on regulated facilities, refer to Appendix B: Regulated Facilities within the Water Supply Protection Area information about these potential sources of contamination.
3. For information about Oil or Hazardous Materials Sites in your protection areas, refer to Appendix C: Tier Classified Oil and/or Hazardous Material Sites.

***THREAT RANKING** - Where there are two rankings, the first is for surface water, the second for groundwater sources. The rankings (high, moderate or low) represent the relative threat of each land use compared to other PSCs. The ranking of a particular PSC is based on a number of factors, including: the type and quantity of chemicals typically used or generated; the characteristics of the contaminants (such as toxicity, environmental fate and transport); and the behavior and mobility of the pollutants in soils and groundwater.

- **Household Hazardous Materials** - Hazardous materials may include automotive wastes, paints, solvents, pesticides, fertilizers, and other substances. Improper use, storage, and disposal of chemical products used in homes are potential sources of contamination.
- **Heating Oil Storage** - If managed improperly, Underground and Aboveground Storage Tanks (USTs and ASTs) can be potential sources of contamination due to leaks or spills of the fuel oil they store.
- **Stormwater** - Catch basins transport stormwater from roadways and adjacent properties to the ground and streams. As flowing stormwater travels, it picks up debris and contaminants from streets and lawns. Common potential contaminants include lawn chemicals, pet waste, and contaminants from automotive leaks, maintenance, washing, or accidents. Visit the Nonpoint Source pollution web site for additional information and assistance at <http://www.state.ma.us/dep/brp/wm/nonpoint.htm>.

Residential Land Use Recommendations:

- ✓ Educate residents on best management practices (BMPs) for protecting water supplies. Distribute the fact sheet "Residents Protect Drinking Water" available in Appendix A and on www.mass.gov/dep/brp/dws/protect.htm, which provides BMPs for common residential issues.
- ✓ Work with the Board of Health, the DPW and the Department to identify areas within the Zone I and Zone II where source protection would occur if municipal sewer was available.

4. Transportation Corridors and Utility Rights-of-way - There are numerous roads and a utility right-of-way through the Muddy Brook Zone II (#470). There are roadways, railroad tracks, and an airport (private with a short, grass runway) in the Ware River Zone I (#193). Catch basins transport stormwater from roadways and adjacent properties to the ground, streams, rivers or reservoir. As flowing stormwater travels, it picks up de-icing materials, petroleum chemicals and other debris on roads and contaminants from streets and lawns. Common potential contaminants in stormwater originate from automotive leaks, automobile maintenance and car washing, or accidental spills. Clandestine dumping is identified as a significant threat to the water supplies and roadways; remote roadways in particular, are frequent sites for illegal dumping of hazardous or other potentially harmful wastes. Right-of-way maintenance can also be a source of contamination. Water suppliers should ensure that the utility managers are using accurate maps of source protection areas.

Railroad tracks run directly through the Zone II and Zone III of the Dismal Well. Rail corridors serving passenger or freight trains are potential sources of contamination due to chemicals released during normal use, track maintenance, and accidents. Accidents can release spills of train engine fluids and commercially transported chemicals.

Transportation Corridor Recommendations:

- ✓ Regularly inspect Zone IIs for illegal dumping and spills.
- ✓ Continue working with local emergency response (ER) teams to ensure that any spills within the protection areas can be effectively contained. Be sure that ER teams for the highway, fire and police departments and the railway company are aware of the protection areas. Provide them with an updated map, if necessary.
- ✓ Work with the municipality or MA Highway to have catch basins inspected, maintained, and cleaned on a regular schedule. Regular street sweeping reduces the amount of potential contaminants in runoff.
- ✓ Consider working with local watershed groups to institute a Storm Drain Stenciling Program, if there is not a local program. For more information on how to develop a storm drain stenciling program go to <http://www.earthwater-stencils.com>.
- ✓ If storm drainage maps are available, review the maps with emergency response teams. If maps aren't yet

available, work with town officials to investigate mapping options such as the upcoming NPDES Phase II Stormwater Rule requiring some communities to complete stormwater outfall mapping. For additional information, refer to the Stormwater Management Information at <http://www.state.ma.us/dep/brp/ww/wwpubs.htm#storm>.

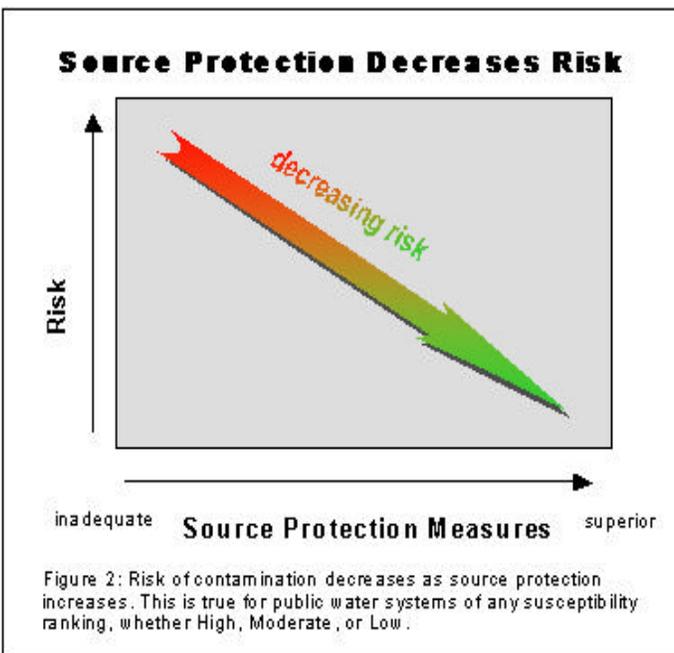
- ✓ Promote BMPs for stormwater management and pollution controls.
- ✓ Work with local officials during their review of the railroad and other utility right-of-way Yearly Operating Plans (YOP) to ensure that water supplies are protected during vegetation control or maintenance of the utility.
- ✓ Review potential USDA funding for mitigation and prevention of runoff pollution through the Environmental Quality Incentives Program (EQIP). The USDA web site is www.ruraldev.usda.gov or call the local office in Hadley at 413-585-1000. Review the fact sheet available on line and call the local office of the NRCS for assistance <http://www.nrcs.usda.gov/programs/farbill/2002/pdf/EQIPFct.pdf>.
- ✓ Visit DEP's Nonpoint Source Pollution web site for additional information and assistance at <http://www.state.ma.us/dep/brp/wm/nonpoint.htm>.

5. Hazardous Materials Storage and Use – Approximately 1% of the Muddy Brook Zone II (#470) is mapped as commercial/industrial land use. Many businesses use hazardous materials, produce hazardous waste products, and/or store large quantities of hazardous materials. If hazardous materials are improperly stored, used, or disposed, they become potential sources of contamination. Hazardous materials should never be allowed to enter a catch basin, septic system or floor drain leading directly to the ground. Vehicle washing is a restricted activity under the UIC regulations. Review the attached fact sheet for additional information about vehicle washing activities.

Activities within the Zone III may also pose a potential threat to the water supply. Specifically, under conditions when the river contributes water to the aquifer, an accidental release to the river may pose a threat to water quality. This report does not include facilities located upgradient of the wells along the Ware River.

Top 5 Reasons to Develop a Local Wellhead Protection Plan

- ❶ Reduces Risk to Human Health
- ❷ Cost Effective! Reduces or Eliminates Costs Associated With:
 - ♦ Increased monitoring and treatment
 - ♦ Water supply clean up and remediation
 - ♦ Replacing a water supply
 - ♦ Purchasing water
- ❸ Supports municipal bylaws, making them less likely to be challenged
- ❹ Ensures clean drinking water supplies for future generations
- ❺ Enhances real estate values – clean drinking water is a local amenity. A community known for its great drinking water in a place people want to live and businesses want to locate.



Hazardous Materials Storage and Use Recommendations:

- ✓ Educate local businesses on best management practices for protecting water supplies. Distribute the fact sheet “Businesses Protect Drinking Water” available in Appendix A and on www.mass.gov/dep/brp/dws/protect.htm, which provides BMP’s for common business issues.
- ✓ Work with the local Board of Health and businesses to register facilities that are unregistered generators of hazardous waste or waste oil. Partnerships between businesses, water suppliers, and communities enhance successful public drinking water protection practices.
- ✓ Educate local businesses on Massachusetts and local floor drain requirements. See the brochure “Industrial Floor Drains” for more information.
- ✓ The USDA has various funding sources for government agencies, non-government organizations and agricultural facilities in small communities through programs such as those listed on the USDA web site <http://search.sc.egov>.

usda.gov/. Additional information is available on the web site www.ruraldev.usda.gov or call the local office in Hadley at 413-585-1000.

4. Agricultural Activities – A small percentage, approximately 3%, of the watershed is agricultural land use. Pesticides, fertilizers and manure have the potential to contaminate a drinking water source if improperly stored, applied, or disposed. Frequently, farms and other large commercial facilities have maintenance garages for equipment and storage tanks. If managed improperly, Underground and Aboveground Storage Tanks (USTs and ASTs) can be potential sources of contamination due to leaks or spills of the products they store.

Agricultural Activities Recommendations:

- ✓ Inform commercial farmers in your protection areas of your water supply protection area and encourage them to work with (or continue working with) the USDA Natural Resources Conservation Service (NRCS) and to have a farm plan to protect water supplies. Review the fact sheet available online at <http://www.nrcs.usda.gov/programs/farmland/2002/pdf/EQIPFct.pdf> and call the local office of the NRCS in Hadley at 413-585-1000, for assistance
- ✓ Encourage farmers and any large commercial property owners to incorporate an Integrated Pest Management (IPM) approach into their pest (plant and insect) management program. IPM is an ecologically-based approach to pest control that links together several related components, including monitoring and scouting, biological controls, mechanical and/or other cultural practices, and pesticide applications. By combining a number of these different methods and practices, satisfactory pest control can be achieved with less impact on the environment.
- ✓ Very often farms and large commercial properties store maintenance equipment and associated petroleum products on site. Promote the use of BMPs for fuel storage, hazardous material handling, storage, disposal, and emergency response planning.
- ✓ Encourage farmers and property managers to ensure that pesticides and fertilizers are being stored within a structure designed to prevent runoff.
- ✓ The USDA has various funding sources for government agencies, non-government organizations and agricultural facilities through programs such as those listed on the USDA web site <http://search.sc.egov.usda.gov/>. One

program in particular, the Environmental Quality Incentives Program (EQIP) may be utilized in a variety of projects from DPW stormwater management to farm nutrient management designed to protect surface and groundwater. Review the fact sheet available online and call the local office of the NRCS for assistance <http://www.nrcs.usda.gov/programs/farmland/2002/pdf/EQIPFct.pdf>.

- ✓ Consider providing hobby farmers with information about protecting their own wells and the public water supply by encouraging the use of BMPs. Refer to <http://www.state.ma.us/dep/brp/dws/dwspubs.htm> and <http://www.state.ma.us/dep/consumer/animal.htm#dwqual> for additional resources. Planning Boards, Boards of Health and Conservation Commissions may be able to provide information on BMPs to hobby farmers as well.

6. Protection Planning – Protection planning protects drinking water by managing the land area that supplies water to a well or reservoir. The Ware Planning Board recently adopted protective bylaws that area in compliance with DEP’s Wellhead Protection regulation 310 CMR 22.21(2). A Wellhead Protection Plan coordinates community efforts, identifies protection strategies, establishes a timeframe for implementation, and provides a forum for public participation. Ware currently does not have a Wellhead Protection Plan.

In some circumstances, under stressed “pumping” conditions, rivers may “lose” or contribute water to an aquifer when the well is located near the river. Therefore, activities within the Zone III along a river that flows into the Zone II, may pose a potential threat to water supply wells adjacent to rivers. Specifically, under conditions when the river contributes water to the aquifer, a release of hazardous materials to the river from an industry or an automobile/train accident may pose a threat to water quality in the well. This report does not include facilities located upgradient of the Zone II along the Ware River or north of Hardwick Pond.

What is a Zone III?

A Zone III (the secondary recharge area) is the land beyond the Zone II from which surface and ground water drain to the Zone II and is often coincident with a watershed boundary.

The Zone III is defined as a secondary recharge area for one or both of the following reasons:

1. The low permeability of underground water bearing materials in this area significantly reduces the rate of groundwater and potential contaminant flow into the Zone II.
2. The groundwater in this area discharges to a surface water feature such as a river, rather than discharging directly into the aquifer.

The land uses within the Zone III are assessed only for sources that are shown to be groundwater under the direct influence of surface water.

Protection Planning Recommendations:

- ✓ Prepare a Wellhead Protection Plan and establish a protection team. Refer to <http://mass.gov/dep/brp/dws/protect.htm> for a copy of DEP's guidance, "Developing a Local Wellhead Protection Plan" and continue current efforts in wellhead protection planning.
- ✓ Inventory facilities upstream within the Zone III, and incorporate any potentially high threat facilities into your Emergency Response Action Plan.

Other land uses and activities within the Zone II that are potential sources of contamination are included in Table 2. Refer to Appendix B for more information about these land uses.

Contact facilities and industries on the river to be sure they include the Water Department in their Emergency Response contact list if there is a release to the river that may impact water quality. Identifying potential sources of contamination is an important initial step in protecting your drinking water sources. Further local investigation will provide more in-depth information and may identify new land uses and activities that are potential sources of contamination. Once potential sources of contamination are identified, specific recommendations like those below should be used to better protect your water supply.

Section 3: Source Water Protection Conclusions and Recommendations

Current Land Uses and Source Protection:

As with many water supply protection areas, the system Zone II and watersheds contain potential sources of contamination. However, source protection measures reduce the risk of actual contamination, as illustrated in Figure 2. The water supplier is commended for taking an active role in promoting source protection measures in the Water Supply Protection Areas through:

- adopting protective bylaws, and
- proactive inspections and knowledge of the Zone II protection areas.

Source Protection Recommendations:

To better protect the sources for the future:

- ✓ Inspect the Zone Is regularly, and when feasible, remove any non-water supply activities.
- ✓ As funds are available and it is feasible, consider extending municipal sewer lines to areas within the Zone I and II that are closest to the wells.
- ✓ Educate residents on ways they can help protect drinking water sources.
- ✓ Continue working with emergency response teams to ensure that they are aware of the stormwater drainage in the Zone II and to cooperate on responding to spills or accidents.
- ✓ Consider working with the local fire department to inventory, as appropriate, non/commercial and residential USTs within the Zone IIs.
- ✓ Partner with local businesses in the Zone II and the Zone III areas to ensure the proper storage, handling, and disposal of hazardous materials and to include the Water Department in their emergency response plans.
- ✓ Monitor progress on any ongoing remedial action conducted for the known oil or contamination sites.
- ✓ Develop and implement a Wellhead Protection Plan.
- ✓ Visit DEP's Nonpoint Source Pollution web site for additional information and assistance on NPS pollution at <http://www.state.ma.us/dep/brp/wm/nonpoint.htm>.

Conclusions:

These recommendations are only part of your ongoing local drinking water source protection. Additional source protection recommendations are listed in Table 3, the Key Issues above and Appendix A.

Additional Documents:

To help with source protection efforts, more information is available by request or online at www.state.ma.us/dep/brp/dws including:

1. Water Supply Protection Guidance Materials such as model regulations, Best Management Practice information, and general water supply protection information.
2. MA DEP SWAP Strategy
3. Land Use Pollution Potential Matrix
4. Draft Land/Associated Contaminants Matrix

For More Information

Contact Catherine V. Skiba in DEP's Springfield Regional Office at (413) 755-2119 for more information and assistance on improving current protection measures.

Copies of this report have been provided to the public water supplier and the town boards.

➤ **Partner with Local Businesses:**

Since many small businesses and industries use hazardous materials and produce hazardous waste products, it is essential to educate the business community about drinking water protection. Encouraging partnerships among businesses, water suppliers, and communities will enhance successful public drinking water protection practices.

➤ **Educate Residents:**

If managed improperly, household hazardous waste, septic systems, lawn care, and pet waste can all contribute to water supply contamination. Hazardous materials include automotive wastes, paints, solvents, pesticides, fertilizers, and other substances. If a septic system fails or is not properly maintained, it is a potential source of microbial contamination. Animal waste is also a source of microbial contamination.

➤ **Provide Outreach to the Community:**

Public education and community outreach ensure the long-term protection of drinking water supplies. Awareness often generates community cooperation and support. Residents and business owners are more likely to change their behavior if they know where the wellhead protection recharge areas are located, what types of land uses and activities pose threats, and how their efforts can enhance protection.

➤ **Other Funding Sources:**

Other grants and loans are available through the Drinking Water State Revolving Loan Fund, the Clean Water State Revolving Fund, and other sources. For more information on grants and loans, visit the Bureau of Resource Protection's Municipal Services web site at: <http://mass.gov/dep/brp/mf/mfpubs.htm>. The USDA also has various funding sources for government, non-government organizations and agricultural facilities through programs such as those listed on the USDA web site <http://search.sc.egov.usda.gov/nrcs.asp?qu=eqip&ct=NRCS>. One program in particular, the Environmental Quality Incentives Program (EQIP) may be utilized in a variety of projects from DPW stormwater management to farm nutrient management designed to protect surface and groundwater. Review the fact sheet available online at <http://www.nrcs.usda.gov/programs/farmbill/2002/pdf/EQIPFct.pdf> and call the local office (Hadley 413-585-1000) of the NRCS for assistance.

The Department's Wellhead Protection Grant Program provides funds to assist public water suppliers in addressing water supply source protection through local projects. Protection recommendations discussed in this document may be eligible for funding under the grant program. Each spring, if funding is available, DEP posts a new Request for Response for the grant program (RFR) on the website <http://www.comm-pass.com/>.

DEP staff, informational documents, and resources are available to help you build on this SWAP report as you continue to improve drinking water protection in your community.

The assessment and protection recommendations in this SWAP report are provided as a tool to encourage community discussion, support ongoing source protection efforts, and help set local drinking water protection priorities. Citizens and community officials should use this SWAP report to encourage discussion of local drinking water protection measures. The water supplier should supplement this SWAP report with local information on potential sources of contamination and land uses. Local information should be maintained and updated periodically to reflect land use changes in the protection areas. Use this information to set priorities, target inspections, focus education efforts, and to develop a long-term drinking water source protection plan.

Section 4: Appendices

- A. Protection Recommendations
- B. Regulated Facilities
- C. Underground Storage Facility
- D. Additional Documents on Source Protection

Table 3: Current Protection and Recommendations

Protection Measures	Status	Recommendations
Zone I		
Does the Public Water Supplier (PWS) own or control the entire Zone I?	NO 01G, 02G and 04G YES 03G	Follow Best Management Practices (BMP's) that focus on good housekeeping, spill prevention, and operational practices to reduce the use and release of hazardous materials. Monitor activities in Zone I.
Are the Zone I posted with "Public Drinking Water Supply" Signs?	YES	Additional economical signs are available from the Northeast Rural Water Association (802) 660-4988.
Are the Zone I regularly inspected?	YES	Continue inspections of drinking water protection areas.
Are water supply-related activities the only activities within the Zone I?	NO	Monitor non-water supply activities in Zone I; investigate options for removing these activities.
Municipal Controls (Zoning Bylaws/Ordinances, Health Regulations, and General Bylaws/Ordinances)		
Does the municipality have Wellhead Protection Controls that meet 310 CMR 22.21(2) ?	YES	Reference mass.gov/dep/brp/dws/ for model bylaws, health regulations, drinking water regulations and current/updated guidance documents.
Do neighboring communities protect the water supply protection areas extending into their communities?	NO	Contact communities upstream of the sources on the Ware River and provide them with information that your sources are downstream. Assist and encourage them in the active protection of the watershed lands.
Planning		
Does the PWS have a local surface water and wellhead protection plan?	NO	Develop a wellhead protection plan. Follow "Developing a Local Wellhead Protection Plan" available at: www.state.ma.us/dep/brp/dws/ .
Does the PWS have a formal "Emergency Response Plan" to deal with spills or other emergencies?	YES	Consider augmenting the plan by developing a joint emergency response plan with fire department, Board of Health, DPW, and local and state emergency officials. Coordinate emergency response drills with local teams. Communicate with facilities upstream of the Dismal Swamp well to be sure they are aware that the Water Department should be included in their ER plans in the event of a release to the river.
Does the municipality have a watershed and wellhead protection committee?	YES	Continue the committee and include representatives from citizens' groups, neighboring communities, and the business community.
Do the Boards of Health conduct inspections of commercial and industrial activities?	NO	Request that the Board of Health consider adoption of hazardous materials handling regulations. For more guidance see "Hazardous Materials Management: A Community's Guide" at www.state.ma.us/dep/brp/dws/files/hazmat.doc .
Does the PWS provide watershed protection education?	YES	Currently, the only outreach is through the annual Consumer Confidence Report. Increase residential outreach through bill stuffers, school programs, Drinking Water Week activities, and coordination with local groups. Aim additional efforts at commercial, industrial and municipal uses within the Zone II and Zone III.

APPENDIX B: REGULATED FACILITIES WITHIN THE WATER SUPPLY PROTECTION AREAS

DEP Permitted Facilities

DEP Facility Number	Facility Name	Street Address	Town	Permitted Activity	Activity Class	Facility Description
	Gilbertville Bottled Gas	109 Gilbertville Road	Ware	Hazardous Waste Generator	Very Small Hazardous Waste Generator	Propane delivery
	Hardwick Auto Sales	551 Greenwich Road	Ware	Hazardous Waste Generator	Very Small Hazardous Waste Generator	Auto Sales
	D. Petracon & Sons/ D & P Bus Co.	100 Pleasant Street	Ware	Waste Oil Generator	Very Small Hazardous Waste Generator/Oil	Sales Repair/Bus terminal
	Four Seasons Repair	53 Crescent Street	Ware	Hazardous Waste Generator	Very Small Hazardous Waste Generator/Oil	Sales Repair/Bus terminal
	Construction & Auto Repair Company		Ware	Not registered		Auto Body & Repair

For information on underground storage tanks, visit the Massachusetts Department of Fire Services web site: <http://www.state.ma.us/dfs/ust/ustHome.htm>
Additional information provided by individual owners

Note: This appendix includes only those facilities within the water supply protection area(s) that meet state reporting requirements and report to the appropriate agencies. Additional facilities may be located within the water supply protection area(s) that should be considered in local drinking water source protection planning.

APPENDIX C – Table of Tier Classified Oil and/or Hazardous Material Sites within the Water Supply Protection Areas

DEP’s datalayer depicting oil and/or hazardous material (OHM) sites is a statewide point data set that contains the approximate location of known sources of contamination that have been both reported and classified under Chapter 21E of the Massachusetts General Laws. Location types presented in the layer include the approximate center of the site, the center of the building on the property where the release occurred, the source of contamination, or the location of an on-site monitoring well. Although this assessment identifies OHM sites near the source of your drinking water, the risks to the source posed by each site may be different. The kind of contaminant and the local geology may have an effect on whether the site poses an actual or potential threat to the source.

The DEP’s Chapter 21E program relies on licensed site professionals (LSPs) to oversee cleanups at most sites, while the DEP’s Bureau of Waste Site Cleanup (BWSC) program retains oversight at the most serious sites. This privatized program obliges potentially responsible parties and LSPs to comply with DEP regulations (the Massachusetts Contingency Plan – MCP), which require that sites within drinking water source protection areas be cleaned up to drinking water standards.

For more information about the state’s OHM site cleanup process to which these sites are subject and how this complements the drinking water protection program, please visit the BWSC web page at <http://www.state.ma.us/dep/bwsc>. You may obtain site -specific information two ways: by using the BWSC Searchable Sites database at <http://www.state.ma.us/dep/bwsc/sitelist.htm>, or you may visit the DEP regional office and review the site file. These files contain more detailed information, including cleanup status, site history, contamination levels, maps, correspondence and investigation reports, however you must call the regional office in order to schedule an appointment to view the file.

The table below contains the list of Tier Classified oil and/or Hazardous Material Release Sites that are located within your drinking water source protection area.

Table 1: Bureau of Waste Site Cleanup Tier Classified Oil and/or Hazardous Material Release Sites (Chapter 21E Sites) - Listed by Release Tracking Number (RTN)

RTN	Release Site Address	Town	Contaminant Type
1-12283	Residence	Ware	Oil
1-12042	Residence	Ware	Oil

For more location information, please see the attached map. The map lists the release sites by RTN.